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Title: LOW BIT ERROR RATE ANTENNA SWITCH FOR WIRELESS COMMUNICATIONS

## IN THE CLAIMS

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Please amend the claims as follows:

1. (Currently Amended) A method for use in a <u>multicarrier</u> wireless communication system, comprising:

approximating a sum of symbol error probabilities for each antenna in a group of antennas, said symbol error probabilities being associated with sub-carriers of a multicarrier symbol, wherein approximating includes using a shortest distance between two received signal points for sub-carriers associated with each antennadetermining symbol error rates for antennas in a group of antennas; and

selecting an antenna from the group of antennas for use in subsequent wireless communication based on the symbol error rates said approximated sums.

(Currently Amended) The method of claim 1, wherein:
 approximating includes evaluating the following equation for each antenna:

$$\sum_{i=1}^{N} \mathcal{Q} \left[ \frac{\|\alpha_{k}(i)d(i)\|}{\sqrt{2}\sigma_{k}(i)} \right]$$

where *i* is a subcarrier index, *k* is an antenna index, N is a number of subcarriers,  $Q(x) = \int_{x}^{\infty} \frac{1}{\sqrt{2\pi}} e^{-\frac{t^2}{2}} dt$  is the probability of error in the constellation, d(i) is the shortest distance between two transmitted constellation points of the *i*th sub-carrier,  $\sigma_k(i)$  is the square root of the variance of the noise plus interference for the *i*th sub-carrier and the *k*th antenna, and  $\|\alpha_k(i)d(i)\|$  is the shortest distance between two received signal points of the *i*th sub-carrier selecting an antenna includes selecting an antenna that has a lowest symbol error rate.

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3. (Currently Amended) The method of claim [[1]]2, wherein: said symbol error rates include average symbol error rates selecting an antenna includes selecting an antenna in the group of antennas that has the lowest approximated sum.

4. (Currently Amended) The method of claim [[3]]1, wherein: approximating includes evaluating the following equation for each antenna:

$$\sum_{i=1}^{N} \frac{\sigma_{k}(i)}{\|\alpha_{k}(i)d(i)\|} \exp \left[-\frac{\|\alpha_{k}(i)d(i)\|^{2}}{4\sigma_{k}^{2}(i)}\right]$$

where i is a subcarrier index, k is an antenna index, N is a number of subcarriers, d(i) is the shortest distance between two transmitted constellation points of the ith sub-carrier,  $\sigma_k(i)$  is the square root of the variance of the noise plus interference for the ith sub-carrier and the kth antenna, and  $||\alpha_k(i)d(i)||$  is the shortest distance between two received signal points of the *i*th sub-carriersaid wireless communication system is a multicarrier system; and said average symbol error rates are averaged over a plurality of sub-carriers.

## 5. - 8. (Canceled)

9. (Currently Amended) An apparatus comprising:

an antenna switch to controllably couple one of a plurality of antennas to a wireless communication circuit; and

a switch controller to select an antenna from said plurality of antennas to be coupled to said wireless communication circuit for use in supporting wireless communication based on symbol error rates associated with antennas in said plurality of antennas, said switch controller to approximate a sum of symbol error probabilities for each antenna in said plurality of antennas, said symbol error probabilities being associated with sub-carriers of a multicarrier symbol, wherein the approximation uses a shortest distance between two received signal points for subcarriers associated with each antenna.

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10. (Currently Amended) The apparatus of claim 9, wherein:

said switch controller includes an error estimator to estimate said symbol error rates associated with said antennas selects said antenna based on the following equation:

$$k_e = \arg\min_{k} \sum_{i=1}^{N} Q \left[ \frac{\|\alpha_k(i)d(i)\|}{\sqrt{2}\sigma_k(i)} \right]$$

where *i* is a subcarrier index, *k* is an antenna index,  $k_e$  is the selected antenna, *N* is a number of subcarriers,  $Q(x) = \int_{x}^{\infty} \frac{1}{\sqrt{2\pi}} e^{-\frac{t^2}{2}} dt$  is the probability of error in the constellation, d(i) is the shortest distance between two transmitted constellation points of the *i*th sub-carrier,  $\sigma_k(i)$  is the square root of the variance of the noise plus interference for the *i*th sub-carrier and the *k*th antenna, and  $\|\alpha_k(i)d(i)\|$  is the shortest distance between two received signal points of the *i*th sub-carrier.

11. (Currently Amended) The apparatus of claim 9, wherein:

said switch controller selects said antenna based on the following equation:

$$k_e = \arg\min_{k} \sum_{i=1}^{N} \frac{\sigma_k(i)}{\|\alpha_k(i)d(i)\|} \exp\left[-\frac{\|\alpha_k(i)d(i)\|^2}{4\sigma_k^2(i)}\right]$$

where *i* is a subcarrier index, *k* is an antenna index,  $k_e$  is the selected antenna, N is a number of subcarriers, d(i) is the shortest distance between two transmitted constellation points of the *i*th sub-carrier,  $\sigma_k(i)$  is the square root of the variance of the noise plus interference for the *i*th subcarrier and the *k*th antenna, and  $\|\alpha_k(i)d(i)\|$  is the shortest distance between two received signal points of the *i*th sub-carriersaid symbol error rates are average symbol error rates.

## 12.-14. (Canceled)

- 15. (Original) The apparatus of claim 9, wherein: said switch controller generates a switch control signal for said antenna switch.
- 16. (Canceled)
- 17. (Original) The apparatus of claim 9, wherein: said wireless communication circuit includes a wireless transmitter.
- 18. (Original) The apparatus of claim 9, wherein: said wireless communication circuit includes a wireless receiver.
- 19. (Original) The apparatus of claim 9, wherein: said wireless communication circuit includes a wireless transceiver.
- 20. (Currently Amended) A system comprising: a plurality of antennas that includes at least one dipole antenna; an antenna switch to controllably couple one of said plurality of antennas to a wireless

communication circuit; and

a switch controller to select an antenna from said plurality of antennas to be coupled to said wireless communication circuit for use in supporting wireless communication—based on symbol error rates associated with antennas in said plurality of antennas, said switch controller to approximate a sum of symbol error probabilities for each antenna in said plurality of antennas, said symbol error probabilities being associated with sub-carriers of a multicarrier symbol, wherein the approximation uses a shortest distance between two received signal points for subcarriers associated with each antenna.

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21. (Currently Amended) The system of claim 20, wherein:

said switch controller-includes an error estimator to estimate said symbol error rates associated with said antennas selects said antenna based on the following equation:

$$k_e = \arg\min_{k} \sum_{i=1}^{N} Q \left[ \frac{\|\alpha_k(i)d(i)\|}{\sqrt{2}\sigma_k(i)} \right]$$

where *i* is a subcarrier index, *k* is an antenna index,  $k_e$  is the selected antenna, *N* is a number of subcarriers,  $Q(x) = \int_{x}^{\infty} \frac{1}{\sqrt{2\pi}} e^{-\frac{t^2}{2}} dt$  is the probability of error in the constellation, d(i) is the shortest distance between two transmitted constellation points of the *i*th sub-carrier,  $\sigma_k(i)$  is the square root of the variance of the noise plus interference for the *i*th sub-carrier and the *k*th antenna, and  $\|\alpha_k(i)d(i)\|$  is the shortest distance between two received signal points of the *i*th sub-carrier.

22. (Currently Amended) The system of claim 20, wherein:said switch controller selects said antenna based on the following equation:

$$k_e = \arg\min_{k} \sum_{i=1}^{N} \frac{\sigma_k(i)}{\|\alpha_k(i)d(i)\|} \exp\left[-\frac{\|\alpha_k(i)d(i)\|^2}{4\sigma_k^2(i)}\right]$$

where *i* is a subcarrier index, *k* is an antenna index,  $k_e$  is the selected antenna, N is a number of subcarriers, d(i) is the shortest distance between two transmitted constellation points of the *i*th sub-carrier,  $\sigma_k(i)$  is the square root of the variance of the noise plus interference for the *i*th subcarrier and the *k*th antenna, and  $\|\alpha_k(i)d(i)\|$  is the shortest distance between two received signal points of the *i*th sub-carriersaid symbol error rates are average symbol error rates.

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(Original) The system of claim 20, wherein: 25. said system is part of a wireless access point.

(Original) The system of claim 20, wherein: 26. said system is part of a wireless network interface card (NIC).